



Thank you for choosing Hammonds...

For over twenty years now, Hammonds Technical Services, Inc. has provided the aviation industry with dependable, easy to maintain additive injectors. Our fluid powered Model 600's are easy to operate, maintain and have been the industry benchmark for dependability. Your new "Smart 600" delivers all those attributes plus delivers real-time ratio reporting and safety alarms. It combines an enhanced fluid motor and injection pump with the latest in programmable logic controls and additive meter.

We appreciate your confidence in our products and pledge to keep our customers on the leading edge of additive metering technology.

Carl Hammonds
HAMMONDS TECHNICAL SERVICES, INC.





TABLE OF CONTENTS

- 3. SPECIAL NOTICE TO USERS
- 5. COMPONENT IDENTIFICATION
- 6. HOW THE SYSTEM WORKS
- 10. INITIAL START UP AND CALIBRATION
- 14. INSTALLING THE ADDITIVE TANK
- 16. STARTING UP THE SYSTEM
- 20. SYSTEM VERIFICATION
- 21. DRAWINGS AND PARTS



Special Notice to Users

The Hammonds “**Smart 600**” fluid powered additive injector represents the latest generation of injection equipment that joins basic fluid powered injection with computer controlled data collection and reporting. The Smart 600 measures both fuel and additive flow, tabulates the injected ratio and displays the information for visual verification that the system is operating at specification. In addition, it tabulates the amount of additive that has been injected, allowing comparison of the reported performance with actual measured fluid consumption from the additive tank and totals represented on the product meter.

Note: The Smart 600 will only be as accurate and dependable as the quality of your installation and additive supply.

The following conditions must be met before the system will function properly.

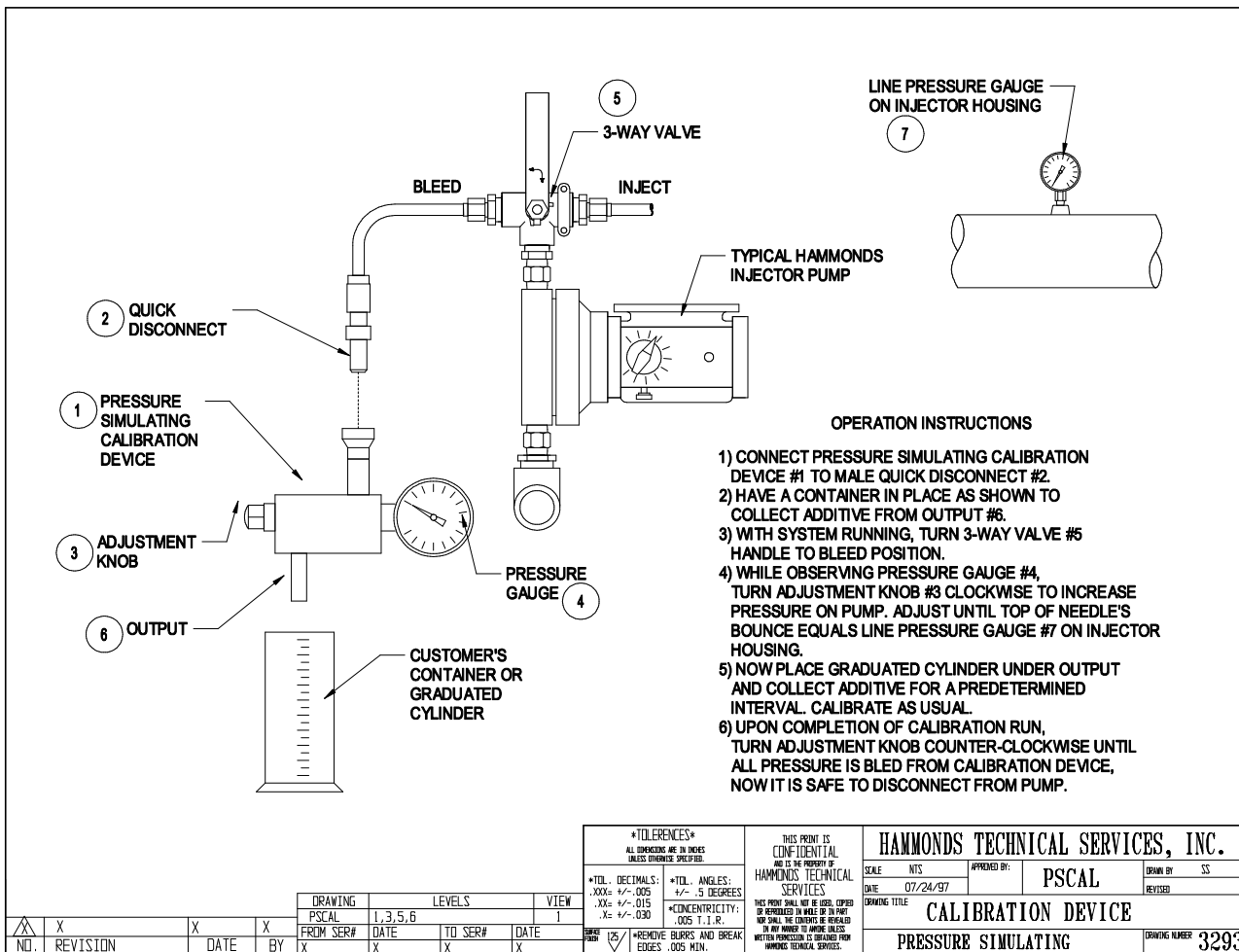
1. The additive tank must be installed with the bottom of the tank being at least as high or higher than the inlet to the injector located on the fluid motor.
2. There can be no quick disconnects, siphon tubes, or temporary 5 - gallon additive jugs used with the system. A permanent additive tank with bottom mounted feed line is mandatory. *Use of any other type of tank will not only affect consistency and accuracy, but void your factory warranty.*
3. The line leading from the tank to the injector must be at least ½”.
4. The fluid motor/injector and additive control panel including meter has been tested and calibrated at the factory. Use of any other additive meter or fluid motor is not acceptable. Consult the factory to be certain the serial number on the control panel and the fluid motor match. The PLC and meter must be calibrated to the fluid motor.
5. Change in ratio is accomplished by reading the digital readout located on the control panel while injecting normally. Either additive or jet fuel may be used for calibration. Under no circumstances can the unit be calibrated to atmosphere. Accuracy can only be achieved when the system is calibrated using actual operating line pressures. This can be achieved by drawing additive from the tank or using devices designed to simulate actual operating line pressures. If you choose to





verify the metered performance, a Hammond's PSCAL (Pressure System Calibration Gauge) is necessary in order to accurately duplicate system operating conditions. The PSCAL is attached to the calibration discharge tube located on the injector where additive is collected for verification.

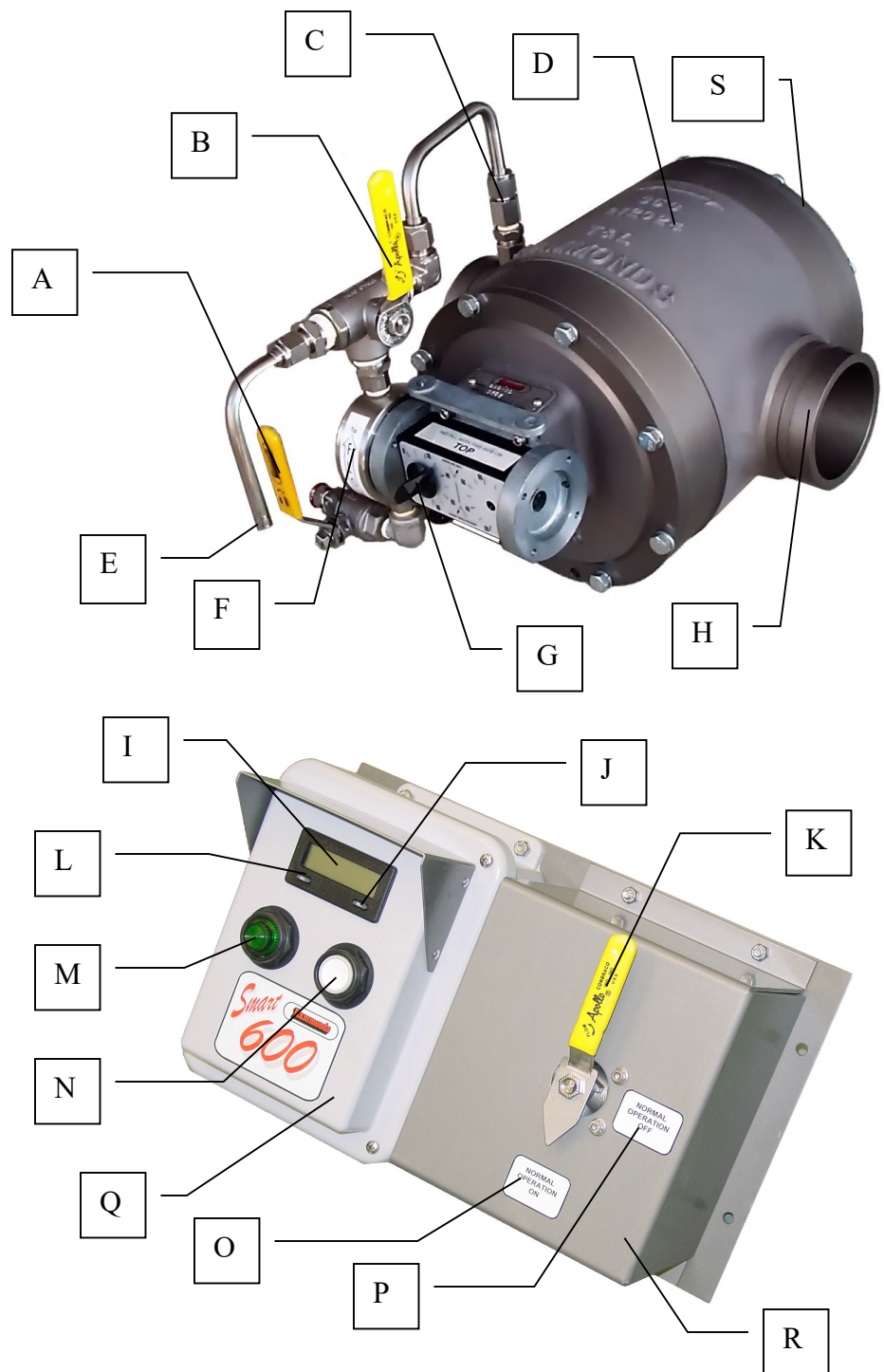
Note: Your system utilizes the latest in metering and computer technology. Volumetric verification is typically necessary during initial start-up and perhaps annually when system product meters are calibrated.



COMPONENT IDENTIFICATION

Take a few moments to review the diagram below. The Smart 600 operates differently than any other injection system in the industry. It is important that you understand what each component does and how they all work together.

A	Additive supply on / off valve
B	On / off valve bleed port
C	Injection point check vlv
D	600 Fluid motor
E	Bleed port
F	"S" Fluid end
G	Calibration knob
H	Victaulic® connection
I	Digital readout
J	Ounce reset button
K	Additive on / off valve
L	Select button
M	Warning beacon
N	Batch reset
O	Normal on position
P	Normal off position
Q	Nema 4x enclosure
R	Control console
S	Pulse sensor

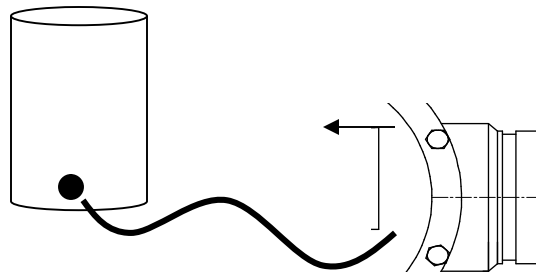


Here's how the system works

It is suggested that you follow the path of additive from the additive storage tank to the injection point in order to understand how each component works.

ADDITIVE TANK

Additive leaves the storage tank through a bottom discharge port and is delivered to the inlet of the additive pump located on the fluid motor.



ADDITIVE INJECTOR

Additive is drawn into the bottom of the injector through the suction check valve. A diaphragm pushes the additive through the injection point check valve and into the product delivery lines. The amount of additive delivered at each stroke is adjustable with the stroke adjustment. The injector is paced by the flow of fuel passing through the fluid motor. The injector responds to the fluid motor proportionately so that the more fuel passes through the system, the more additive is delivered at a fixed ratio. The injector produces a continuous flow of additive to the injection point.



FLUID MOTOR

The fluid motor functions both as a motive force to drive the additive injector and also as a meter to report the amount of fuel passing through the system. The fluid motor *is not* intended to tabulate fuel totals and is not certified by weights and measures. However, it has been calibrated to report to the Smart 600 PLC the amount of fuel passing through the system, and this is

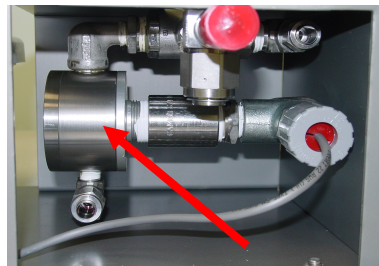
Fluid Motor



accomplished by a sensor mounted in the rear of the fluid motor housing that counts the revolutions of the fluid motor rotor. The Smart 600 fluid motor reports flow with the same consistency as your product meter. That information is then delivered to the PLC for processing. The fluid motor is operating anytime fuel is being delivered by the system.

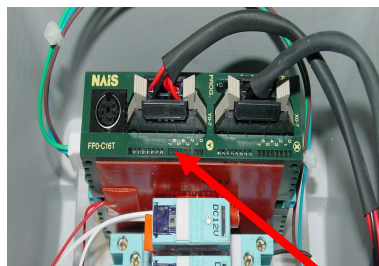
ADDITIVE METER

The additive meter is a precision flow-measuring device that is located inside the control console. It measures the amount of additive delivered by the injector and reports to the Smart 600 PLC. The additive meter measures only the additive that is delivered to the injection point when the on/off valve is in the "ON" position.



SMART 600 PLC

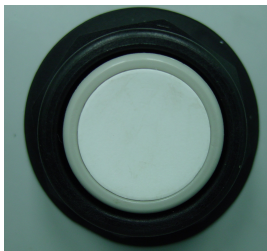
The PLC (Programmable Logic Controller) is powered up and running anytime the ignition of the truck is running. It is constantly in a ready state to receive information. When the selector valve in the control console is placed in the "ON" position, additive flow is measured by the additive meter. As soon as the PLC registers flow from the meter, it activates the program that instantly compares the amount of additive being delivered with the amount of fuel passing through the fluid motor. Using the stored ratio formula, the PLC calculates the actual ratio of additive that is being delivered and registers that data in "PPM" (parts per million) on the digital readout located on the front of the control console.



In addition, it tabulates the amount of additive that has been delivered and records it into memory. The operator can toggle to either read PPM ratio or accumulated total on the digital readout by simply pressing the "Select" button located on the face of the digital panel.



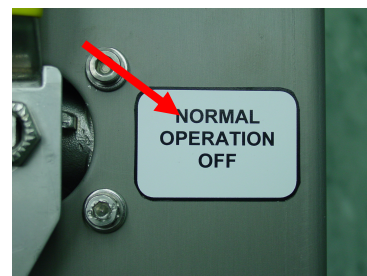
The PLC keeps a running total of the accumulated additive ratio that has been injected since the beginning of the fueling operation. In addition, the PLC signals that the system is operating within ASTM standards of 1000 – 1500 PPM by illuminating a green light located on the panel. If the system fails to deliver the proper ratio, the light will turn off. If desired, a permissive circuit within the controller will notify the truck system components that there has



been a failure. When fueling stops, the system will continue to reflect the total PPM injected as well as the accumulated total of additive, and keep the green specification light illuminated until the system is re-set manually by depressing the white button on the control panel or until 5 minutes has elapsed. At that time, the ratio counter will automatically reset to zero. By depressing the select button you can toggle between the additive ratio and additive ounces. The additive ounces can be reset to zero by depressing the reset button once. This will put the system in a state of readiness, awaiting the next fueling operation.



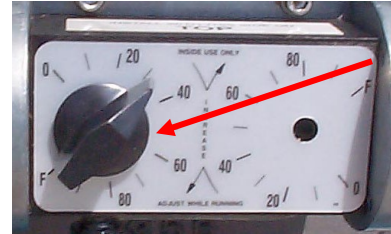
When the ON/OFF valve is placed in the “OFF” position, the additive is re-circulated to the additive tank and the additive meter is by-passed. As long as the meter senses no flow of additive, the PLC doesn’t report a ratio, but is in a “ready state” awaiting the next additized fuel delivery.





CALIBRATION

Since your Smart 600 reports the injected ratio continuously, it is not necessary to “calibrate” the system unless the ratio falls below or above the desired ratio. Most users calibrate their systems in the range of 1200 PPM. It is normal for the injected ratio to vary by ± 50 PPM during the course of an average fueling. If the average falls outside your desired limits, it is a simple matter to make very small adjustments, using the stroke adjustment knob, as the system is running with the results being reflected on the digital readout. There is no need to collect samples of additive. Since the additive meter is measuring all of the additive delivered, the results of any adjustments are constantly being reflected.



Note: In order to reset the accumulated total, depress batch reset button after each stroke adjustment change, which will reset the accumulated total.

CAUTION: Read the calibration instructions carefully before making any changes to system settings.

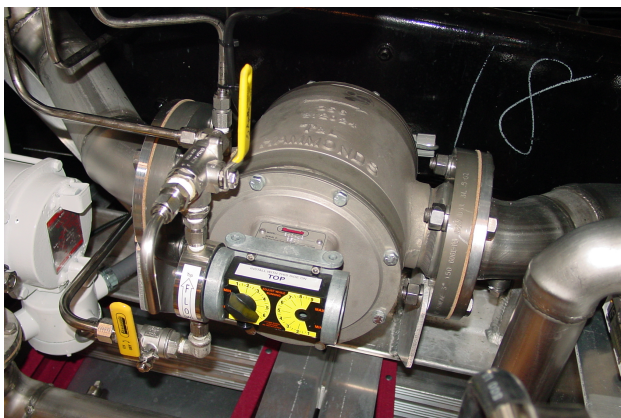
If you have any questions whatsoever regarding the operation of your new Smart 600, consult your Hammonds representative. Your complete satisfaction is guaranteed.

INSTALLATION AND PREPARATION FOR STARTUP

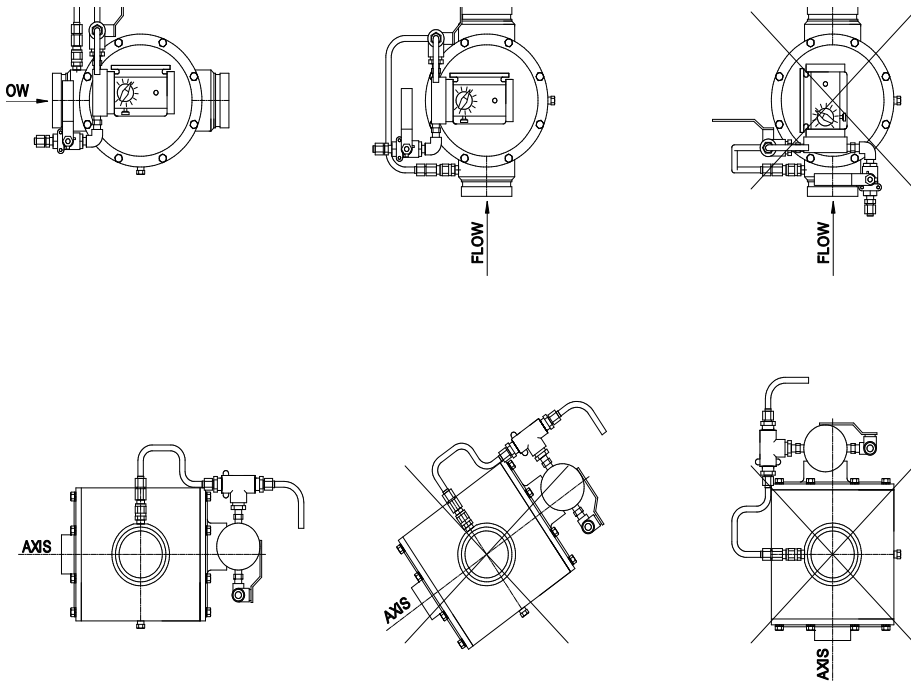
INSTALLING THE FLUID MOTOR/INJECTOR

The fluid motor can be installed at any point in the fluid stream downstream of the truck product pump.

Mount the motor at a location that allows for access to the injector pump controls and on / off valve bleed port located on the injector.



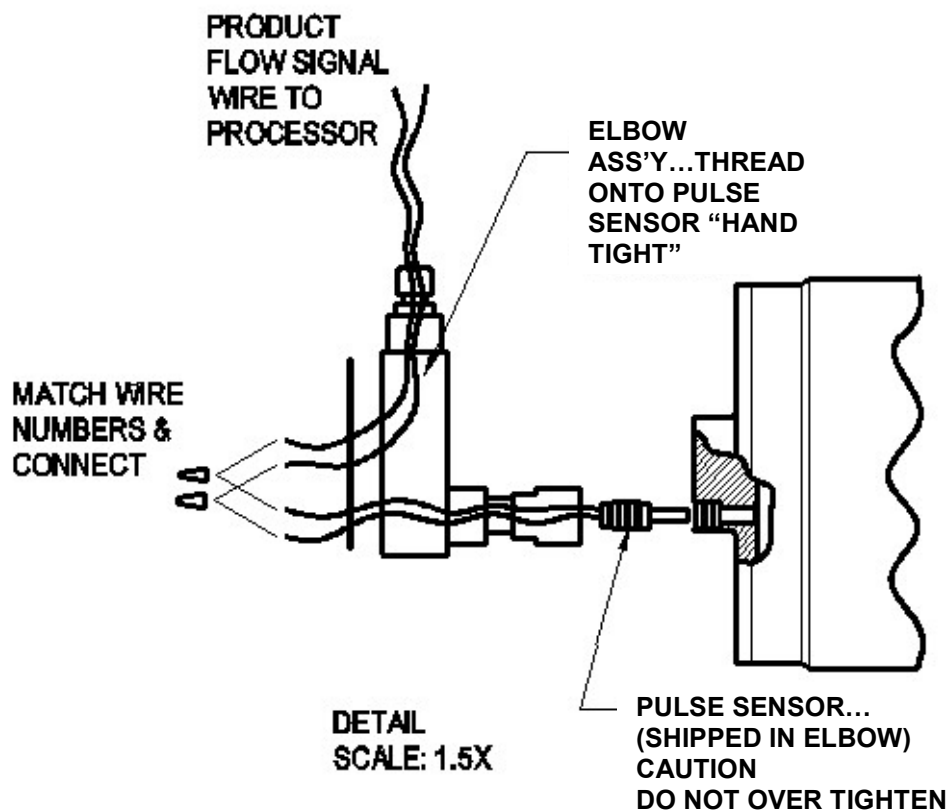
We do not recommend installing a fluid motor upstream of the product pump (on the suction side) since the additional friction loss caused by the fluid motor would affect the performance of the product pump. In addition, mounting upstream of the product pump would create a negative pressure at the fluid motor, and if injection took place at that point, the suction of the truck product pump would tend to siphon additive into the fuel system rather than meter it, making the adjustment of the injector ineffective. Mount the fluid motor with the shaft of the motor parallel with the ground as illustrated below.



If your system utilizes Victaulic® connections, be sure the system is braced in some way so that it does not rotate on its axis. A simple metal brace running from the truck frame to one of the side plate bolts is sufficient. If not braced, the bouncing and vibration of the truck can cause the fluid motor to rotate.

CONNECTING THE FLUID MOTOR PULSE SENSOR

There is a threaded hole located on the backside of the fluid motor that accepts the pulse sensor for the fluid motor. Install the probe into the fluid motor housing followed by the conduit adapter as shown. Be careful in handling the pulse sensor. **Hand-tighten the probe when installing.** Match the numbered wires together in the conduit elbow assembly.



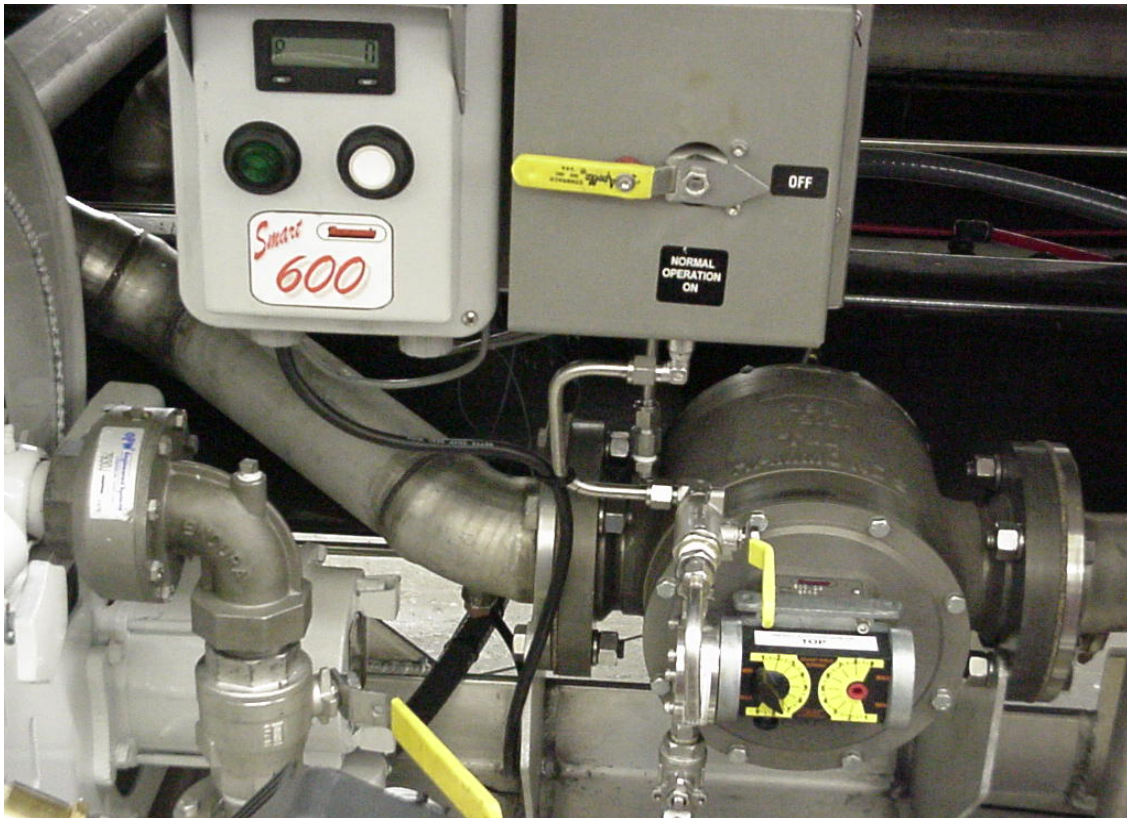
Note: It is important that the pulse sensor be installed all the way into the threaded portion of the injector side plate. Failure to do so will cause the sensor to not recognize the rotating rotor and not accurately tabulate fuel flow.

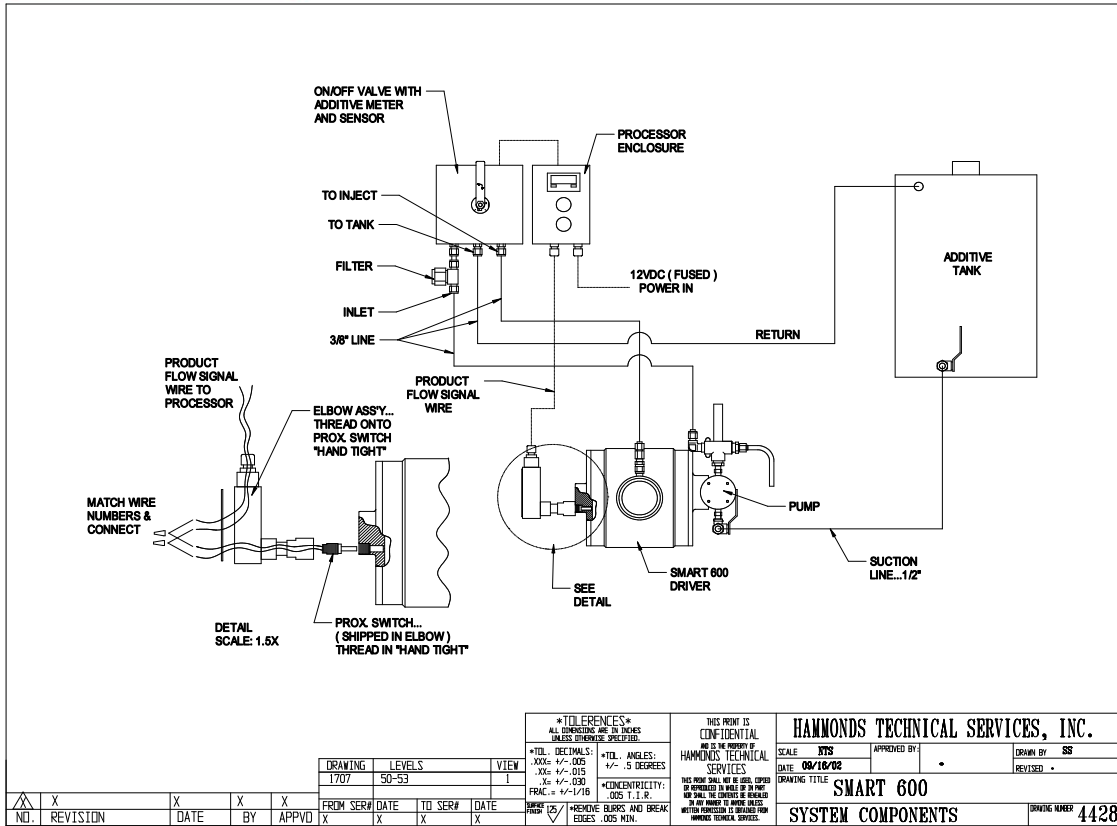
However, you must not over-tighten or use a wrench on the pulse sensor. Be careful not to damage the delicate wires that exit the sensor.

After installing the sensor, install the conduit elbow, again snug, ***but not wrench tight!*** ***Support the leading to the control panel with tie wraps so vibration will not act on the conduit connection.***

INSTALLING THE CONTROL PANEL

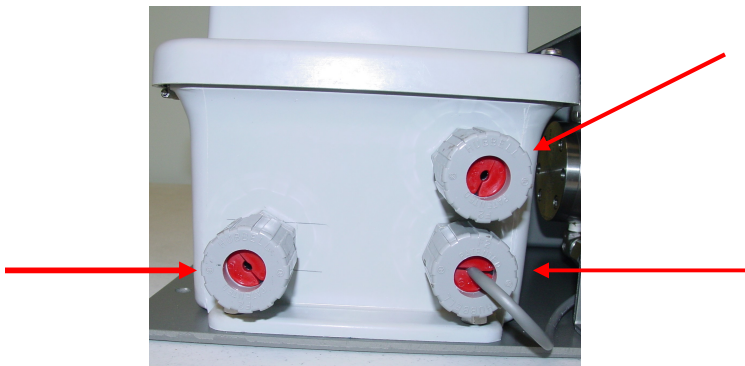
The control panel contains the PLC (programmable logic controller) and the additive meter. It should be located at some point visible to the operator when fueling aircraft, usually close to the main product meter and or hose reels. The unit should be mounted to a solid vertical surface that is not subject to excessive vibration. Three lines will be connected to the Control Panel as noted below. Review diagram on next page.





CAUTION

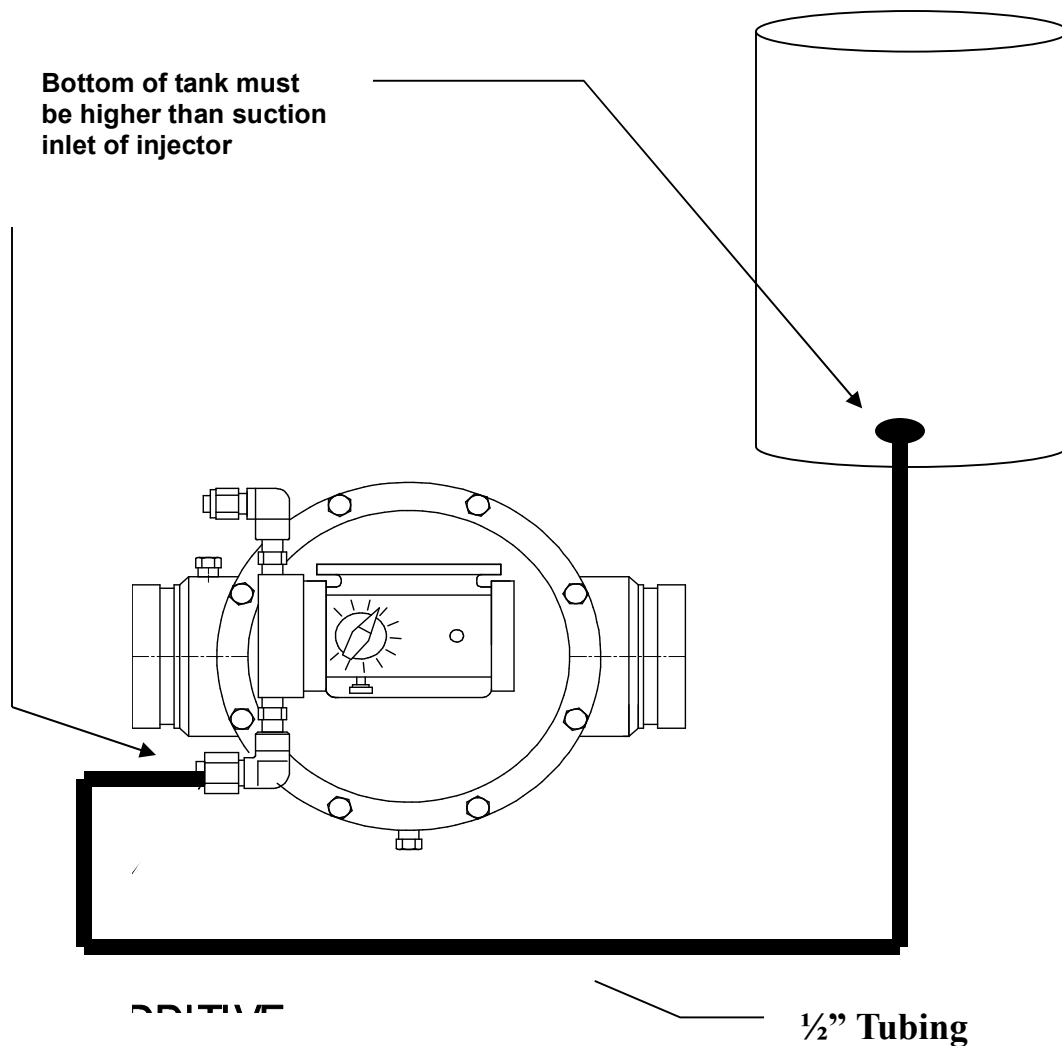
Use care in connecting the three additive lines to the panel. A backup wrench should be used at the bulkhead preventing loosening of the fittings inside the panel. Check the fittings inside for fitting tightness and leaks after installation is complete.





INSTALLING THE ADDITIVE TANK

THIS IS THE MOST IMPORTANT PART OF YOUR INSTALLATION! The injector must be provided with an uninterrupted supply of additive at all times. You must use a tank that has a **bottom mounted port** so that additive is supplied to the injector without the possibility of inducing air. There can be no quick disconnects in this line. A minimum of 1/2" tubing must be utilized for the suction line. Using any smaller line will cause the pump to starve when the system is operated at high volumes. **DO NOT USE 3/8" TUBING TO SUPPLY THE INJECTOR.** However, 3/8" tubing can be used with "return to tank" line.





INSTALLING THE ADDITIVE TUBING

Using the above illustration as a guide, install the tubing as indicated.

- 3/8" tubing from the injector output to the inlet filter on the control panel
- 3/8" tubing from the center connection of the control console to the tank return port. (this recirculates additive when the system is in the "OFF" position.
- 1/2" line from the tank bottom connection to the suction inlet of the additive injector located on the fluid motor.

Note: The bottom of the additive tank must be at least as high or higher vertically than the inlet of the injection pump. The system will not provide consistent performance unless the tank is located in this way.

- Route tubing in the shortest possible route.
- Tubing should be secured throughout the run.
- Stainless steel tubing is recommended. If flexible poly tubing is used, keep in mind that ultra violet rays from the sun will deteriorate the tubing making periodic replacement necessary.



STARTING UP THE SYSTEM

Your Smart 600 has been flow tested and calibrated at the factory at a ratio of 1250 PPM for FSII additive. It will be up to you to check the setting and decide what you want the final injected ratio to be. The automatic fail-safe feature that signals if the ratio is within ASTM limits is set for a low limit of 1000 PPM and a high limit of 1500 PPM. If the system fails to delivery a ratio between these set points, the green light on the control panel will not illuminate, and if you have chosen to use the permissive circuit, other alarms or interruptions in your system controls can be utilized.

If you are installing a brand new system, it is recommended that you make your first calibration and start-up run with jet-A as an additive while the refueller is in recirculation mode, i.e. not fueling the aircraft. In this manner, you can calibrate the system without fear of over-additizing the fuel either in the refueler or the aircraft. Follow the steps below to start-up and calibrate the system, but first read the following brief description so you will know what to expect in the process.

OVERVIEW OF STARTUP AND CALIBRATION CHECK

You will use jet-A as an additive. With the single point connected to the belly valve of the refueller and a normal operating pressure of approximately 50 psi, you will first bleed the air out of the injector system. Operate the system with the valve in the bleed position until a solid pulse is discharged from the bleed port.

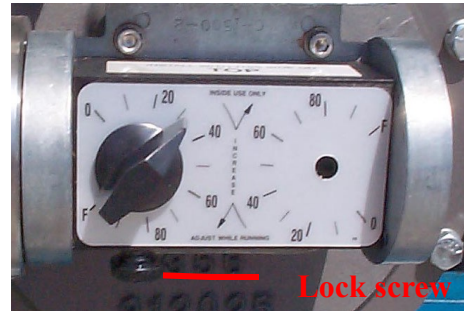
Note: Make sure the bleed valve is turned to the “inject” position before placing the additive on/off valve on the panel to the “on” position. If this bleed port valve is in the “bleed” position while injecting, additive will come out of the bleed port.



After insuring the bleed port is in the “inject” position, place the additive supply on/off valve in the “ON” position. The injector will begin delivering jet-A to the product line just as it would additive. Assuming you have primed the pump and bled all the air from the system, you will get a green light within a few moments after fuel flow begins. This tells you the system is delivering within it’s specification. Select the digital readout to show “R” which stands for Rate, and

read the PPM shown on the panel. If you desire to adjust the system for more or less ratio, you will make **very small** adjustments to the stroke length of the injector.

The ratio you are reading is reflecting an average total ratio of additive that has been delivered since the circulation or simulated fueling has begun. Note the ratio increases or decreases slowly as you adjust the pump stroke setting. Remember to depress the white, batch-reset button after every calibration adjustment. When you have achieved the desired setting, tighten the lock screw on the injector. The calibration is complete. You can adjust flow rate up or down to verify that the ratio will not vary appreciably. At the end of your test run, you can toggle the select button on the face of the digital read out to total, and the system will tell you how many total ounces you have delivered during your run.



To recap the startup instructions:

1. Place about ½ - 1 gallon of Jet A in the additive tank. Be sure the vent on the tank is open, and the cap on the desiccant dryer has been removed.



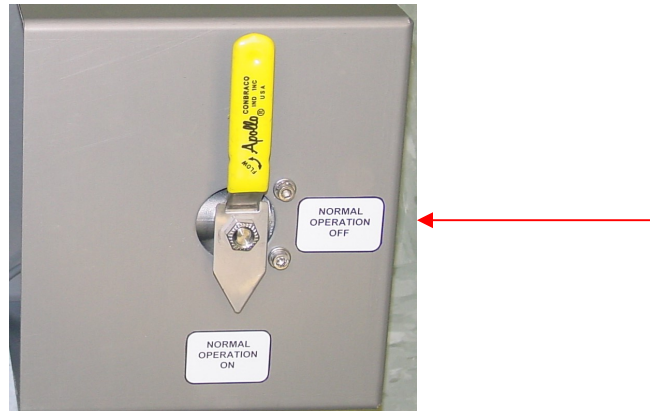
2. Open the valve bleed port to the bleed position.



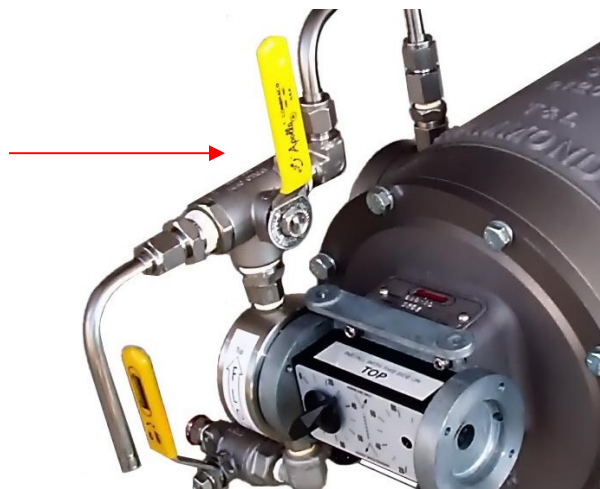
3. Make sure the additive supply valve on the inlet of the injector, between the injector and the additive tank is open.



4. Be sure the additive on/off valve is in the OFF position.



5. Connect the single point nozzle to the belly valve or other re-circulation point in the truck tank.
6. Begin circulating fuel and watch for solid, air free discharge of fuel out of the on/off valve bleed port on the injector. Let it run for 5 - 10 seconds, then turn the on/off bleed port valve to the inject position. Let the system continue to run for another 30 seconds or so, this will fill the line leading to the control panel, pushing any air in the system back to the additive tank.



7. Turn the additive ON/OFF valve on the control panel to the ON position. Watch the green light on the digital readout, with the "R" selected. This will read out PPM ratio of the system. Note, it will take a few seconds for



the system to purge all the air out of the additive meter and begin reading steadily. During this period, you may see some erratic blinking of the green light. It will clear itself of air if you have done a good job of priming the pump and return line before this step. Warning: If specified ratio (1000-1500 PPM) for this batch is not met within 30 seconds, the green light will turn **off** and the interrupt relay contacts will open. (This relay can be utilized to shut down the product pump)

Toggles between PPM & Ounces



8. Set your fuel rate at a medium fueling speed in the range of 75 – 125 GPM, and begin monitoring your calibration check. Give the system a few seconds to stabilize at the ratio, and then, if you desire, make adjustments to raise or lower the injection ratio. ***If you are making any changes in the stroke adjustment, it will be easier to reset the system by depressing white, batch reset button. That way, the system will immediately reflect the changes you have made in the ratio.***

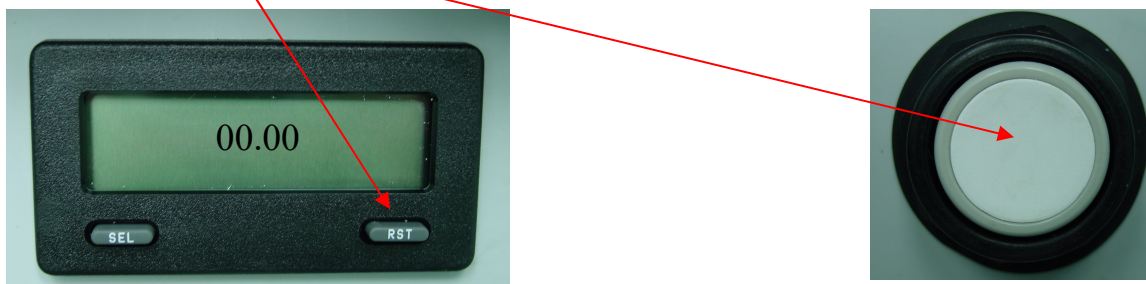
9. Make sure to drain the remaining amount of Jet-A from the tank and replace with FSII additive.

If you have any questions or problems with this procedure, please call the factory for assistance. We will be glad to talk you through the process. Remember, your system has been thoroughly tested and calibrated at the factory. If it fails to work on your initial start-up, it is likely because of some small connection or air in the system. In any case.....***if you have problems, don't fight it.....CALL THE FACTORY.***

800-582-4224



Check your ratio after each fueling. The digital readout will retain the final ratio until it automatically resets itself after 5 minutes, or you re-set it manually by pushing the white, batch reset button on the digital readout. Also, the accumulated total can be reset by depressing the ounce reset button on the digital display.



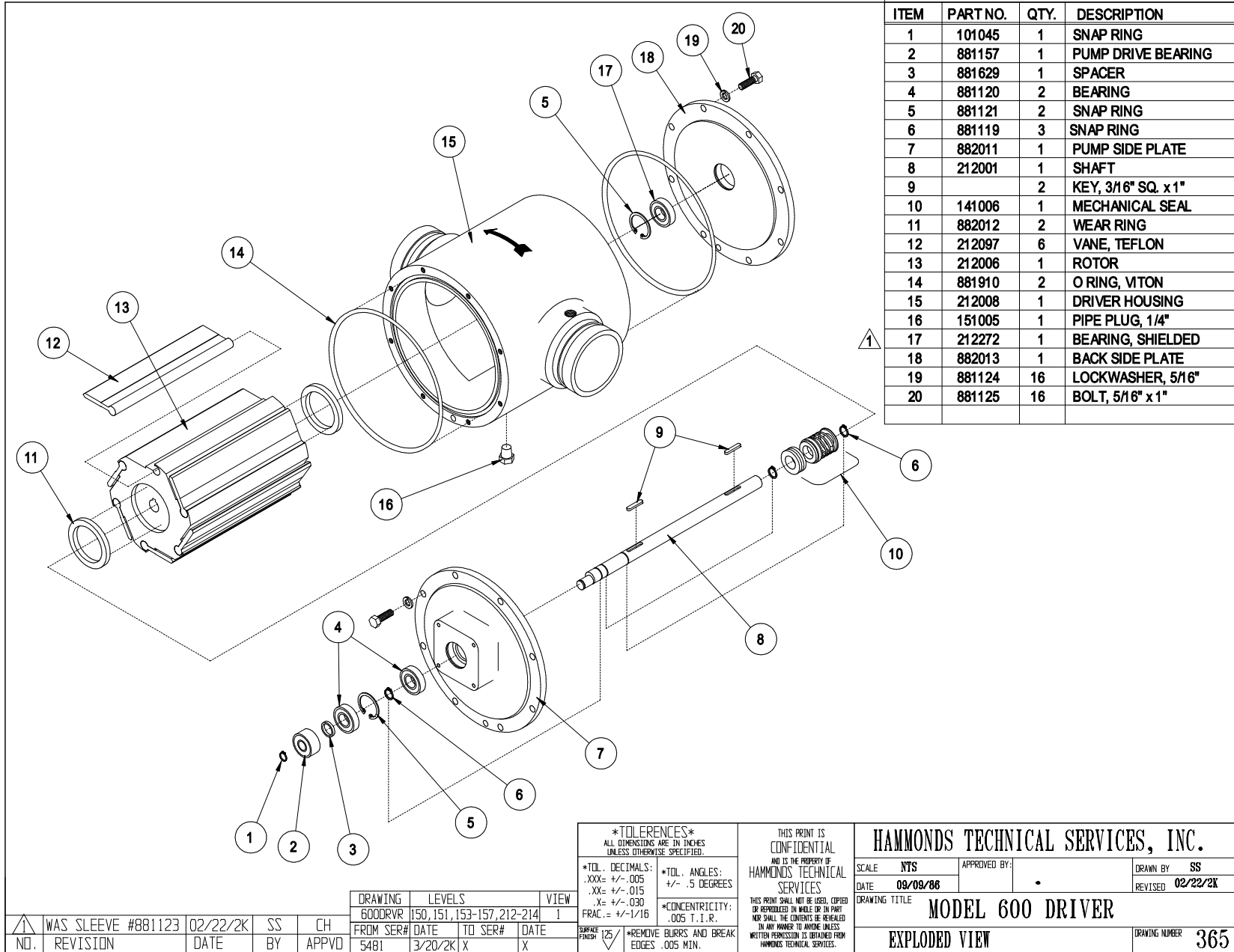
System verification

If you would like to check the system periodically against volumetric measurement, simply record the level in the additive tank and register the meter reading on the truck. After a period of activity, perhaps several thousand gallons of fuel delivered with additive, compare the two numbers to see if your consumption of additive compares with the fuel delivered with FSII.

Remember, you don't additize every drop of fuel you sell, so when making this comparison, be sure you know how much fuel has been delivered through the system with additive.



Hammonds Technical Services, Inc.



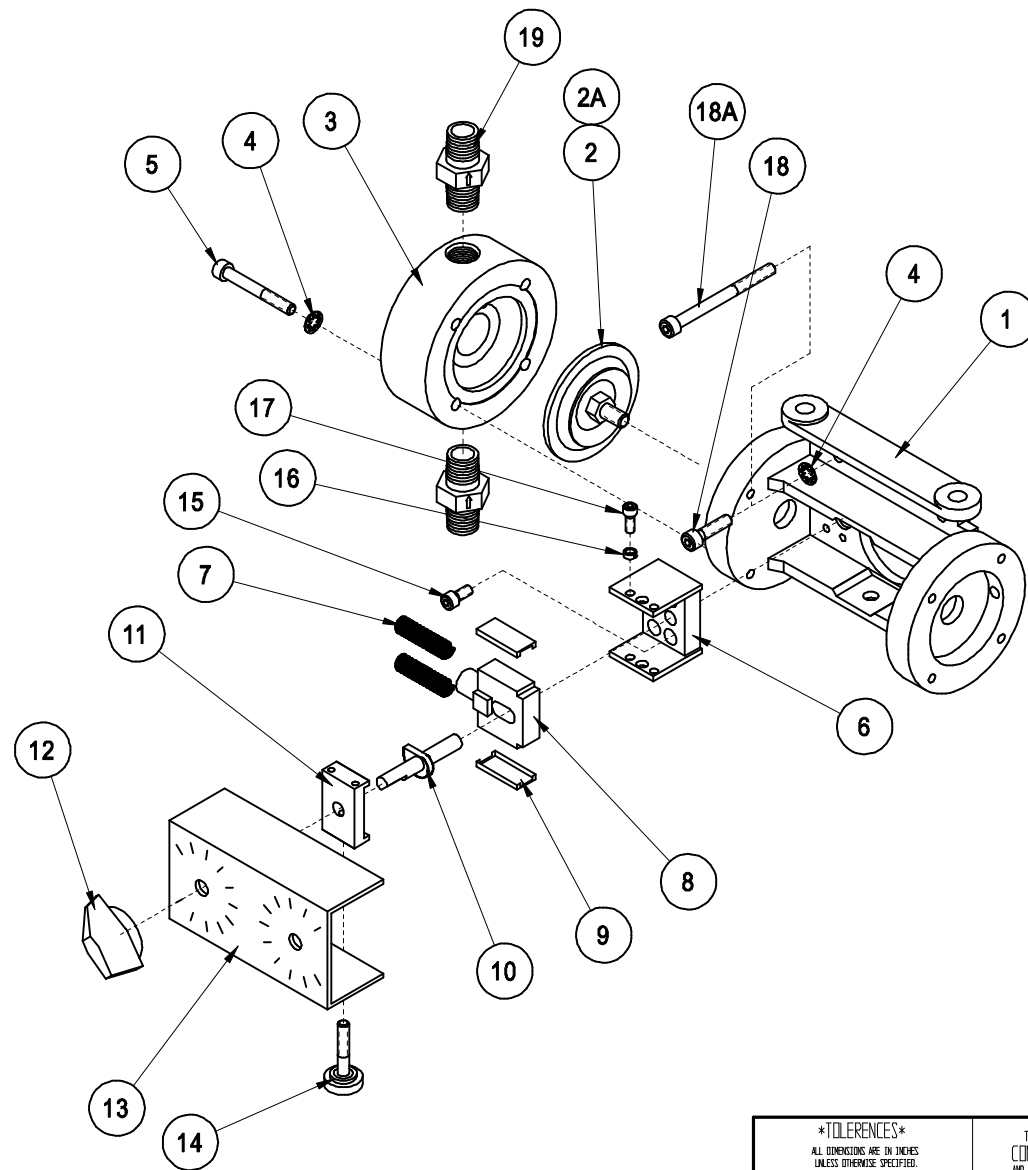
ITEM	PART NO.	QTY.	DESCRIPTION
1	101045	1	SNAP RING
2	881157	1	PUMP DRIVE BEARING
3	881629	1	SPACER
4	881120	2	BEARING
5	881121	2	SNAP RING
6	881119	3	SNAP RING
7	882011	1	PUMP SIDE PLATE
8	212001	1	SHAFT
9		2	KEY, 3/16" SQ. x 1"
10	141006	1	MECHANICAL SEAL
11	882012	2	WEAR RING
12	212097	6	VANE, TEFLON
13	212006	1	ROTOR
14	881910	2	O RING, VITON
15	212008	1	DRIVER HOUSING
16	151005	1	PIPE PLUG, 1/4"
17	212272	1	BEARING, SHIELDED
18	882013	1	BACK SIDE PLATE
19	881124	16	LOCKWASHER, 5/16"
20	881125	16	BOLT, 5/16" x 1"

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<p>*TOL. DECIMALS: .XXX= +/- .005 .XX= +/- .015 .X= +/- .030 FRAC. = +/- 1/16</p>		<p>*TOL. ANGLES: +/- .5 DEGREES</p>		<p>SCALE: NTS DATE: 09/09/86</p>	
<p>SURFACE FINISH: 125</p>		<p>*CONCENTRICITY: .005 T.I.R.</p>		<p>APPROVED BY: [Signature]</p>	
<p>*REMOVE BURRS AND BREAK EDGES .005 MIN.</p>		<p>THIS PRINT SHALL NOT BE USED, COPIED OR REPRODUCED IN WHOLE OR IN PART NOR SHALL THE CONTENTS BE REVEALED IN ANY MANNER TO ANYONE UNLESS WRITTEN PERMISSION IS OBTAINED FROM HAMMONDS TECHNICAL SERVICES.</p>		<p>DRAWN BY: SS REVISED: 02/22/2K</p>	
<p>DRAWING LEVELS VIEW 600DRVR 150,151,153-157,212-214 1</p>		<p>DRAWING TITLE: MODEL 600 DRIVER</p>		<p>DRAWING NUMBER: 365</p>	
<p>NO. REVISION</p>		<p>DATE</p>		<p>BY APPVD</p>	

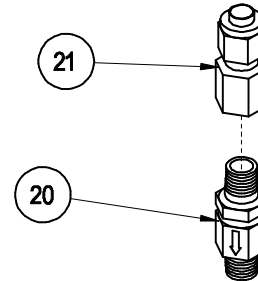
WAS SLEEVE #881123	02/22/2K	SS	CH
5481	3/20/2K	X	X



Hammonds Technical Services, Inc.



ITEM	PART NO.	QTY.	DESCRIPTION
1	101014	1	POWER FRAME
2	101016	1	DIAPHRAGM, S
2A	101455	1	DIAPHRAGM, S, VITON (OPTION)
3	102001	1	FLUID END, S
4	882949	8	LOCK WASHER, #10
5	101037	4	SCREW, 10-32 x 1 1/2"
6	101842	1	CROSSHEAD GUIDE
7	101007	2	RETURN SPRING
8	101006	1	CROSSHEAD
9	101152	2	SLIDE BEARING
10	101005	1	STROKE ADJUSTMENT CAM
11	101003	1	CAM GUIDE
12	101001	1	STROKE ADJUSTMENT KNOB
13	101002	1	POWER FRAME COVER
14	101004	1	LOCK SCREW
15	101009	4	SCREW, 8-32 x 3/8"
16	881086	4	LOCKWASHER, #6
17	101010	4	SCREW, 6-32 x 3/8"
18	881089	4	SCREW, 10-32 x 3/4"
18A	881660	4	SCREW, 10-32 x 2 1/4" (OPT)
19	102263	2	CHECK VALVE
20	101671	1	CHECK VALVE, INJECTION
21	101088	1	3/8 x 1/4 FNPT TUBE ADAPT.



WAS #101008	08/99	SS
ADDED INJ CHK VLV	01/06/98	SS
NO. REVISION	DATE	BY

DRAWING	LEVELS	VIEW
INJECTOR	10, 12, 14, 16, 18, 20, 24, 28, 30-33, 37, 39-44, 129	7
FROM SER#	DATE	TO SER#
X	X	X

TOLERANCES
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

*TOL. DECIMALS:	*TOL. ANGLES:
.XXX= +/- .005	+/- .5 DEGREES
.XX= +/- .015	*CONCENTRICITY:
.X= +/- .030	.005 T. I. R.

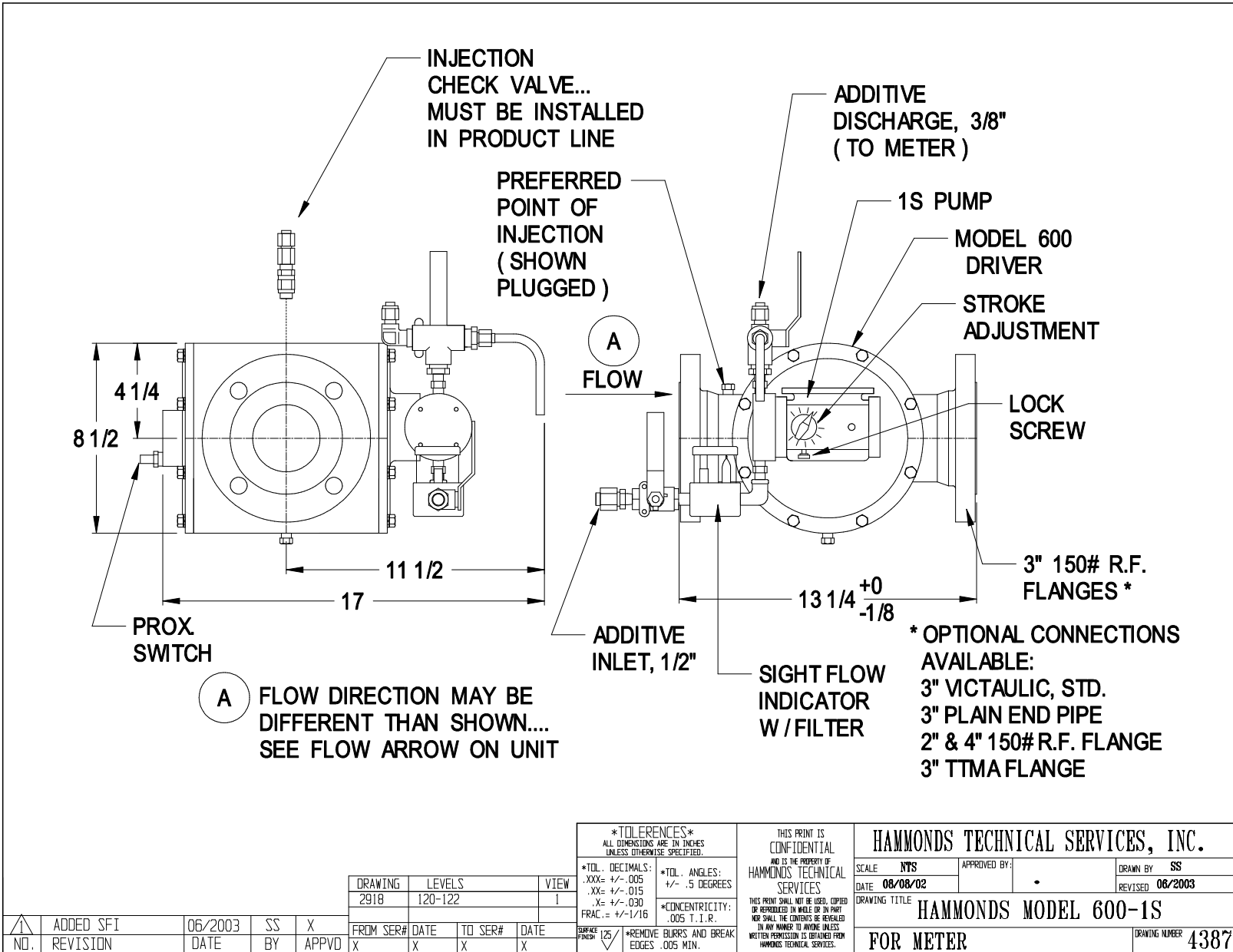
SURFACE FINISH 125/√ REMOVE BURRS AND BREAK EDGES .005 MIN.

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HAMMONDS TECHNICAL SERVICES, INC.			
SCALE NTS	APPROVED BY:	DRAWN BY SS	REVISED 08/99
DATE 10/15/91	DRAWING TITLE		DRAWING NUMBER 1358
HAMMONDS 1S PUMP			

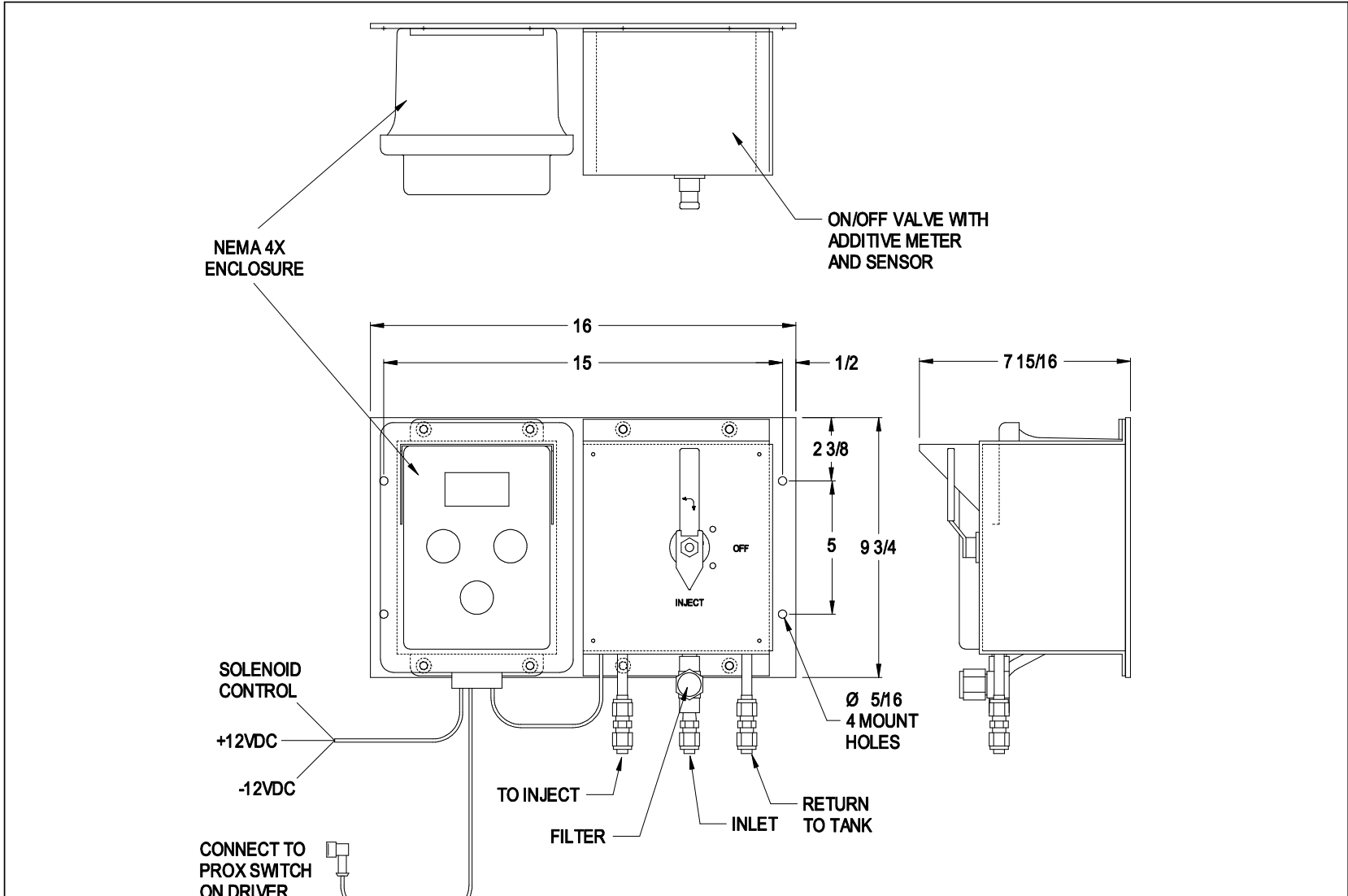


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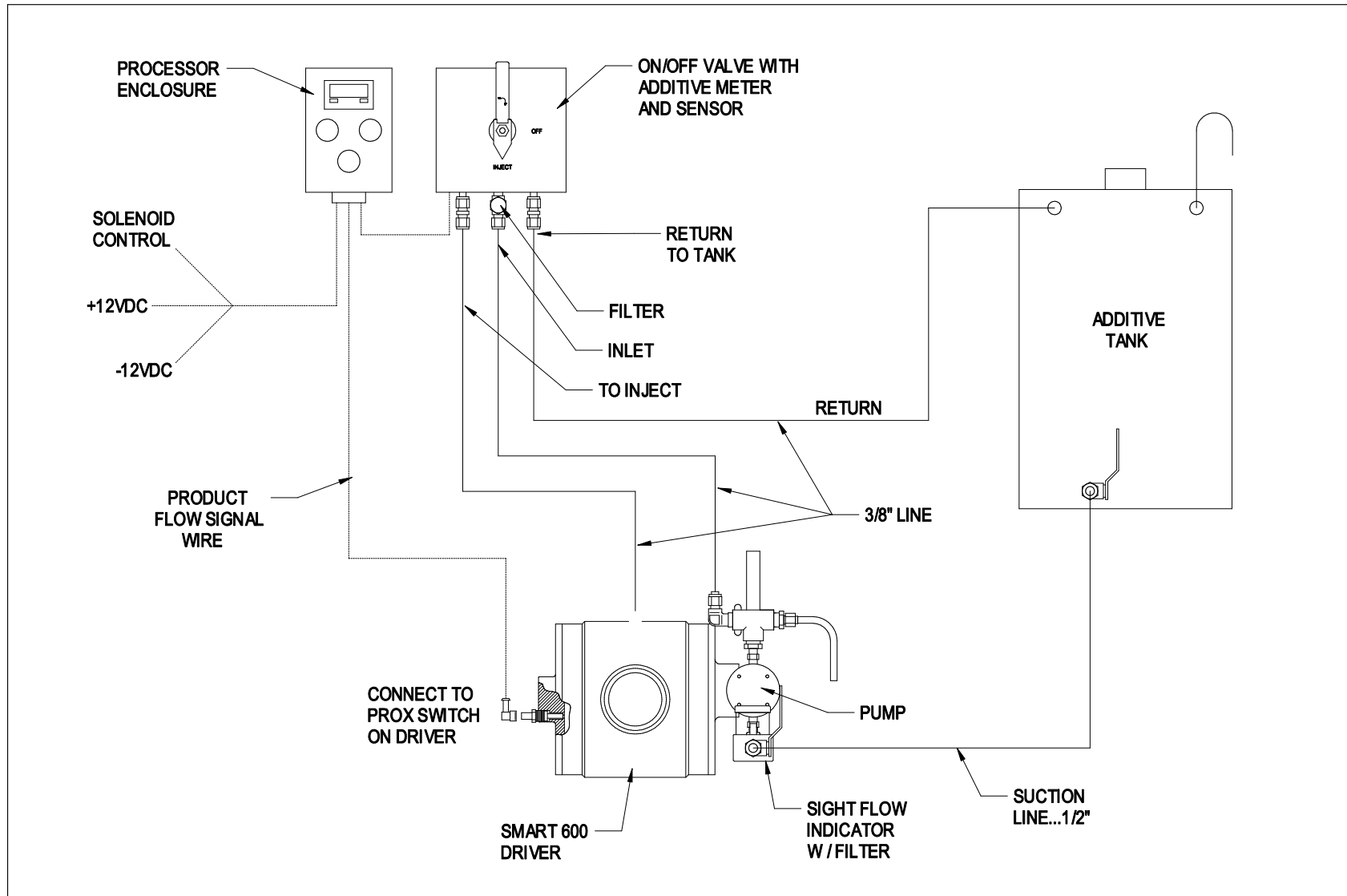




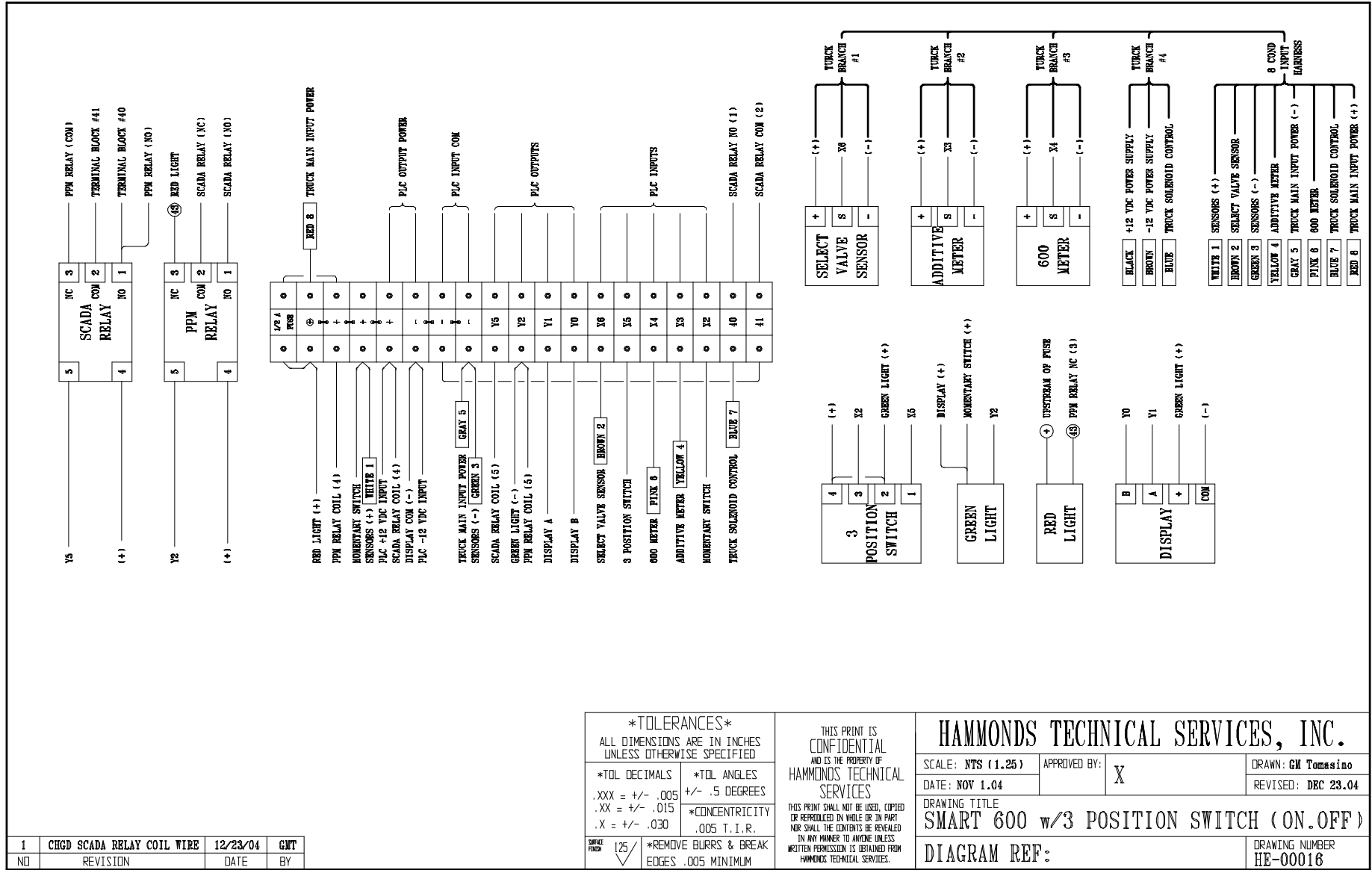
Hammonds Technical Services, Inc.



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<p>ILLUSTRATION</p>					<p>DRAWING NUMBER 4421</p>																											



<table border="1"> <tr> <td>DRAWING</td> <td>LEVELS</td> <td>VIEW</td> </tr> <tr> <td>1707</td> <td>50-53</td> <td>1</td> </tr> </table>				DRAWING	LEVELS	VIEW	1707	50-53	1	<p>*TOLERANCES* ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.</p> <p>*TOL. DECIMALS: .XXX= +/- .005 .XX= +/- .015 .X= +/- .030 FRAC.= +/- 1/16</p> <p>*TOL. ANGLES: +/- .5 DEGREES</p> <p>*CONCENTRICITY: .005 T.I.R.</p> <p>*REMOVE BURRS AND BREAK EDGES .005 MIN.</p>				<p>THIS PRINT IS CONFIDENTIAL AND IS THE PROPERTY OF HAMMONDS TECHNICAL SERVICES</p> <p>THIS PRINT SHALL NOT BE LOANED, COPIED OR REPRODUCED IN WHOLE OR IN PART NOR SHALL THE CONTENTS BE REVEALED IN ANY MANNER TO ANYONE UNLESS WRITTEN PERMISSION IS OBTAINED FROM HAMMONDS TECHNICAL SERVICES.</p>		<p>HAMMONDS TECHNICAL SERVICES, INC.</p> <p>SCALE: NTS DATE: 09/16/02</p> <p>APPROVED BY: [Signature] DRAWN BY: SS REVISED: -</p>													
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NO.	REVISION	DATE	BY	APPVD																									
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<p>SYSTEM COMPONENTS</p>																													



1	CHGD SCADA RELAY COIL WIRE	12/23/04	GWT
NO	REVISION	DATE	BY

TOLERANCES
 ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

*TOL DECIMALS .XXX = +/- .005 .XX = +/- .015 .X = +/- .030	*TOL ANGLES +/- .5 DEGREES
*CONCENTRICITY .005 T.I.R.	

REMOVE BURRS & BREAK EDGES .005 MINIMUM

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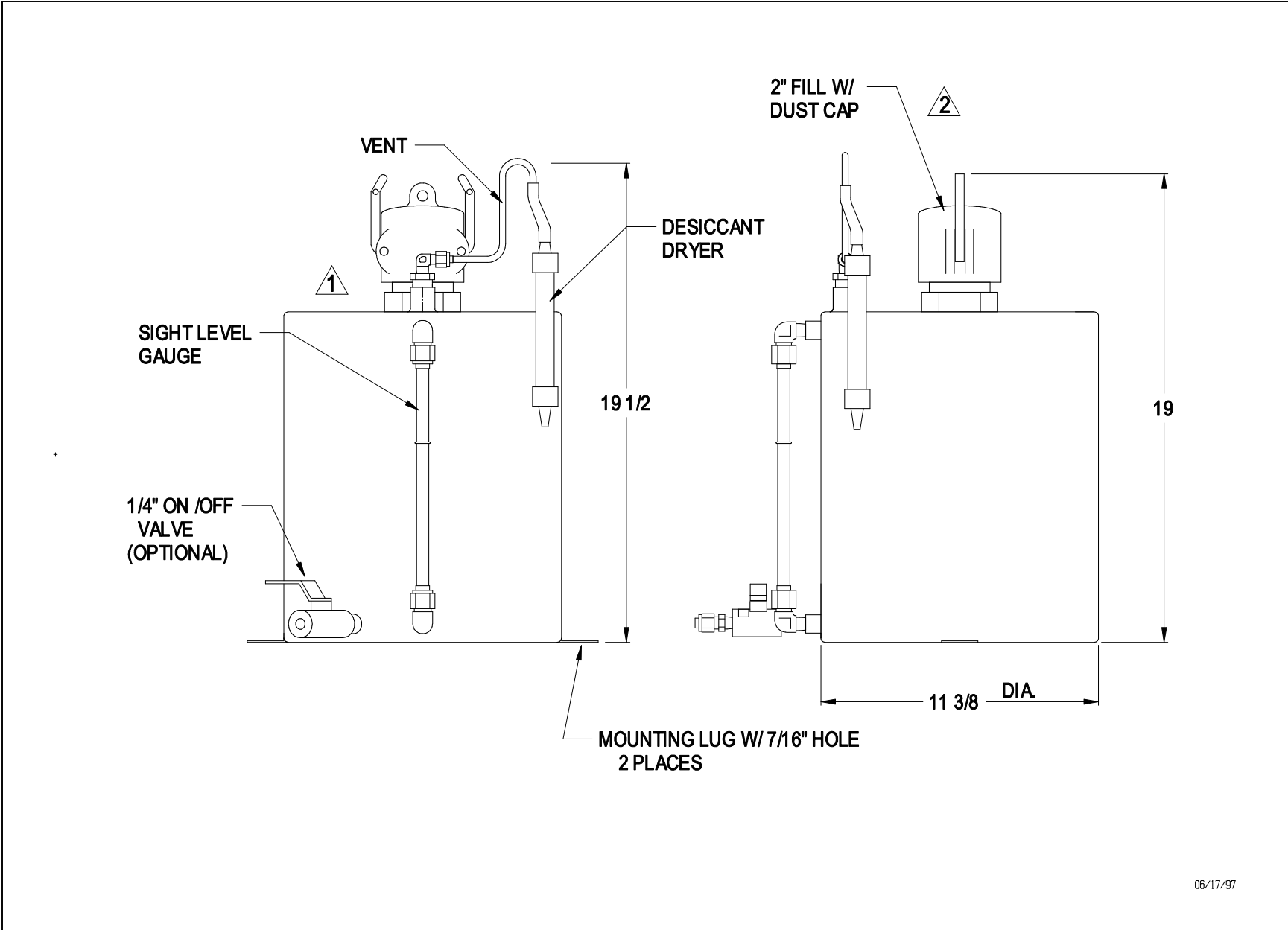
HAMMONDS TECHNICAL SERVICES, INC.

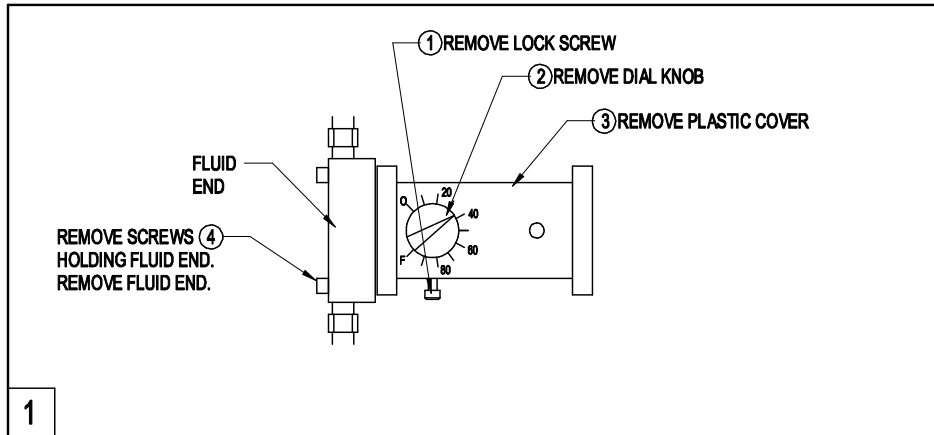
SCALE: NTS (1.25)	APPROVED BY: X	DRAWN: GH Tomssino
DATE: NOV 1.04		REVISED: DEC 23.04

DRAWING TITLE:
SMART 600 w/3 POSITION SWITCH (ON/OFF)

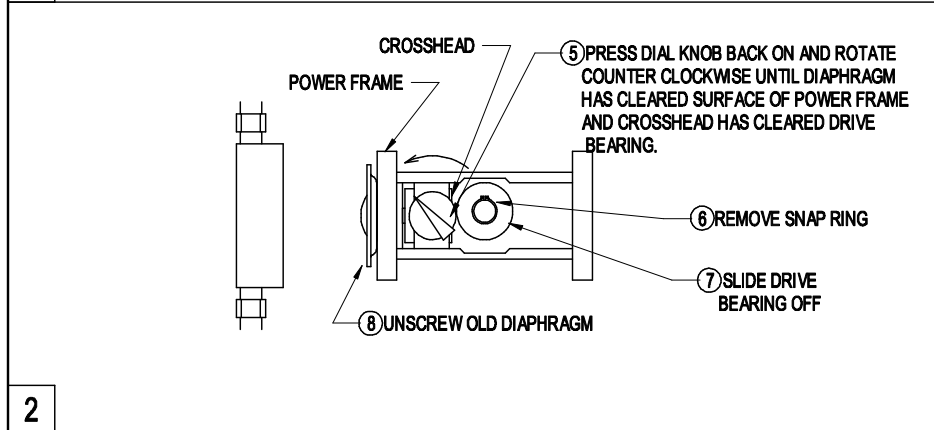
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DRAWING NUMBER:
HE-00016

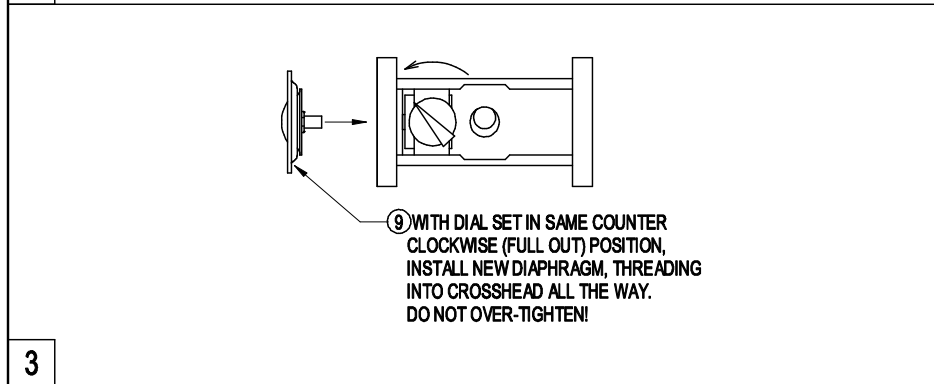




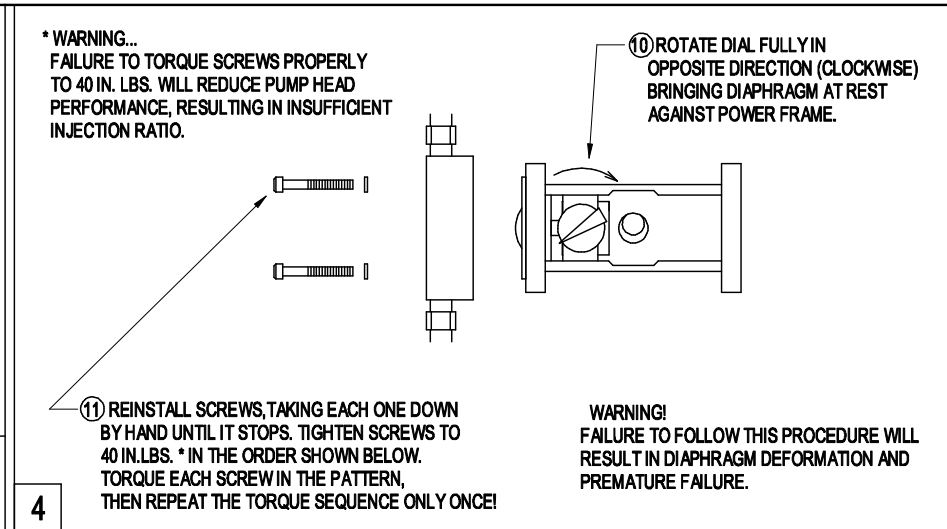
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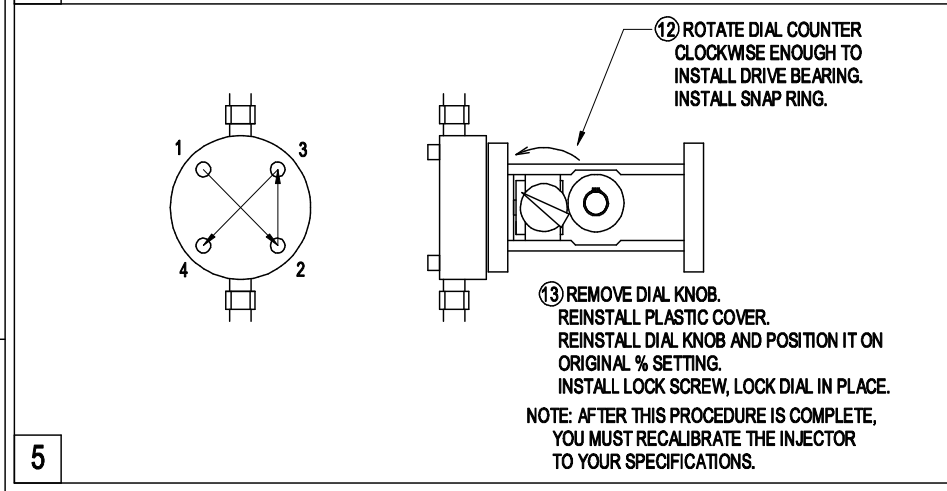
2



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5

HAMMONDS TECHNICAL SERVICES, INC.			
FOR TECHNICAL ASSISTANCE CALL HAMMONDS TECHNICAL SERVICES (281) 999-2900	SCALE NTS	APPROVED BY:	DRAWN BY S.S.
	DATE 2/11/92		REVISED 4/10/92
	DRAWING TITLE "S" DIAPHRAGM REPLACEMENT		DRAWING NUMBER 1459